Materials Engineering Branch

TIP*

No. 015 Antistatic Properties of Transparent Films

Author(s): Alex Montoya Contact: (301) 286-6882

Space flight hardware is commonly wrapped in transparent antistatic films while they are in storage, after they have been precision cleaned, or while they await further integration or testing. These films ideally allow the hardware to be visually inspected while limiting the possibility of being contaminated by handling or other outside sources and provide protection against the buildup of damaging static charges. In the past, these films came in various types and colors. Polyethylene, Nylons and polyesters are examples of the polymers used to produce antistatic bagging and films. Bags referred to as "pink poly" were commonly used as antistatic bags. These bags also came in green and blue. As of this writing, the antistatic film of choice currently employed at GSFC is Llumalloy a nickel coated polyester film. It has been found that this film gives the best static charge protection while limiting the amount of contamination that potentially can be transferred from the bag to the hardware. This is because it does not use a chemical antistatic agent.

Antistatic films are a constantly evolving technology. Antistatic agents can take one of two forms, external or internal. The external usually consists of an antistatic agent applied to the surface. This agent can be removed with solvent cleaning. The internal agents are normally added to the polymer during formulation. As the surface agent is depleted or removed, additional antistatic agents migrate to the surface to replace it. Three of the most popular antistatic agents are glycerol monostearate, ethoxylated fatty acid amines, and diethanolamides. In addition, non-migratory antistatic agents such as, carbon black, metallized fillers and carbons fibers are used.

When considering use of a new film, some things that should be considered are as follows:

1. Most chemical antistatic agents require atmospheric moisture to perform properly. Therefore, changes in humidity will effect how well an antistatic film will protect sensitive hardware stored inside of it.

2. The chemical antistatic agents are a potential source of contamination. Hardware stored inside of a film can be contaminated when they come into contact with the film's surface.

The proposed film must be tested in conditions that closely resemble its usage conditions. A chemical analysis should also be performed to determine the amounts and identities of any potential contaminants that may be transferred from the film during use.